

**AMENDMENTS TO THE SPECIFICATION**

In the specification please add the following paragraph before the last line from the bottom of the page 4,

DIN53461-B states that the test set-up should correspond and comply with the requirements described in sections 3.2 through 3.6 below.

**3.2 Bending Device**

The bending device consists of two supports and one bending die made of metal. The edges have a radius of curvature of  $3 \pm 0.2$  mm. The support span is  $(100 \pm 2)$  mm. It must be possible to apply the force in the center of the support span, perpendicular to the orientation of the test body, by means of the bending die. The vertical connecting pieces between the supports, and the cover that the deflection measuring device rests upon, must be made of a material that has the same coefficient of linear expansion as the bending die.

To produce the force, weights which apply a bending stress of  $1.80 \text{ N/mm}^2$  (method A),  $0.45 \text{ N/mm}^2$  (method B), or  $5.0 \text{ N/mm}^2$  (method C) are used. When calculating the mass of the weights, it is necessary to account for the weight of the bending die and, if necessary, the measurement force of the measuring device used to measure deflection. A set of variety of weights is recommended to make it possible to set the necessary bending force (limit deviations  $\pm 2.5\%$ ).

**3.3 Immersion Bath**

A suitable heat transfer liquid in which the test body can be immersed must be used for the immersion bath. The bath must have a stirring device. It must be possible to raise the bath temperature at a steady rate of 2 K/min (see Section 5.4).

A heat transfer liquid should be used that is stable at the temperatures employed, and which does not influence the properties of the test body.

### **3.4 Temperature Measurement Device**

The temperatures are measured with 2 temperature measurement devices; tolerances  $G=0.5$  K. The devices must extend to the depth for which the tolerances apply, but no less than 50 mm deep.

### **3.5 Deflection Measuring Device**

The measurement device must be capable of determining the deflection of the test body to 0.01 mm.

### **3.6 Linear Measurement Device**

The linear measurement device must be capable of determining the height and width of the test body to 0.1 mm.

## **4 Test Bodies**

### **4.1 Shape and Fabrication**

The test bodies have a length  $l$  of at least 110 mm, a width  $b$  of 3.0 to 4.2 mm, and a height  $h$  of 9.8 to 15.0 mm, with the exception of test bodies made of slab products, whose width  $b$  may be between 3 and 13 mm. The test bodies should be produced or sampled in such a manner that the force of pressure used in their fabrication has acted on the surface  $A = l \cdot h$ .

**4.1.1** If not otherwise specified in the relevant standards for the plastic product, or not otherwise agreed between supplier and customer, test bodies of thermosetting molding materials are produced according to DIN 53 451, and test bodies of thermoplastic materials are produced either through injection molding or through compressed molding while taking into account the conditions specified in the relevant standards regarding molding materials.

The test results depend upon the manufacturing conditions of the test body and upon the pretreatment (for example, drying, temperature treatment, conditioning). Hence, precise specifications for these conditions are necessary in arbitrational analysis.

#### **4.2 Quantity**

At least 2 test bodies from each sampled product must be tested.

#### **4.3 Pretreatment**

The test bodies must be pretreated in accordance with the relevant standards for the molding compound or in accordance with the agreements between supplier and customer.

### **5 Procedure**

**5.1** Prior to testing, the width  $b$  and the height  $h$  are measured to 0.1 mm in the center of the test body.

**5.2** The test body is placed on end on the supports. The temperature measurement devices are inserted in such a way that they extend to within 2 mm of, but do not touch, the test body in the vicinity of the pressure die. At the start of each test, the bath temperature should be 20 to 23°C unless preliminary testing has demonstrated that a different starting temperature does not cause any errors with the product under test.

**5.3** The force calculated for methods A, B or C per Section 3.2 is applied to the test body.

After the load has been maintained for 5 minutes, the deflection measuring device is set to zero and the heat is turned on. The 5-minute waiting period can be omitted if the test body deflects less than 0.02 mm in this period of time.

**5.4** The temperature of the bath is steadily raised by 2 K/min. There must never, at any time during the test, be a difference of more than 1 K between the specified and actual temperatures. The temperature at which the test body has achieved the deflection specified in the following table is the heat deflection temperature.

Table 2

Height $h$ of the Test Body mm	Test Body Deflection mm
9.8 to 9.9	0.33
10.0 to 10.3	0.32
10.4 to 10.6	0.31
10.7 to 10.9	0.30
11.0 to 11.4	0.29
11.5 to 11.9	0.28
12.0 to 12.3	0.27
12.4 to 12.7	0.26
12.8 to 13.2	0.25
13.3 to 13.7	0.24
13.6 to 14.1	0.23

14.2 to 14.6	0.22
14.7 to 15.0	0.21

**5.5** If the heat deflection temperatures of the two test bodies differ from one another by more than 2 K, additional tests must be performed, and the individual values must be given as the results.

In the case of semicrystalline thermoplastics whose glass transition temperature lies between the starting temperature and the heat deflection temperature, it is possible that the deflection temperature function in the range of required deflection defined in Section 5.4 can be sufficiently flat in one of the methods defined in Section 3.2 (e.g., method B) that reproducibility and comparability of the test method become very uncertain. In these cases, the test can only be performed with one of the other methods (e.g. method A or C) described in Section 3.2.

## **6. Evaluation**

**THE AVERAGE, ROUNDED TO 1K, OF THE INDIVIDUAL VALUES IS THE HEAT DEFLECTION TEMPERATURE HDT/A, HDT/B OR HDT/C.**

In the specification please amend the paragraph at page 25, line 1

In Examples 1 to 8 ~~and 20 to 30~~ and Comparative Examples 1 and 2, ~~1, 2, 5 and 6~~, two methods for toner preparation are employed. However, the toner formulation and the resin structure are common, so that the results on the evaluation items are the same.

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